ORIGINAL ARTICLE

FORENSIC ODONTOLOGY AND DENTAL STATUS OF ADULT PATIENTS ATTENDING THE OUT PATIENT DENTAL DEPARTMENT OF A TERTIARY CARE HOSPITAL

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Background: Pakistan is one of the countries where practice of forensic odontology and its record keeping is poor due to which we face difficulty in identification of individuals in disasters and other medicolegal problems. The objectives of this study were to know the status of forensic odontology and to determine the dental status of adult patients attending dental outpatient department of Ayub Teaching Hospital Abbottabad. **Methods**: A cross-sectional Study was carried out from 1st September to 30th September 2018 in the Department of Dentistry, Ayub Teaching Hospital, Abbottabad. A questionnaire was designed including preliminary record, standard dental chart, notation chart and other variables. A sample of 96 patients having all permanent teeth were included and examined. Non-probability convenience sampling was used. Data was collected and analyzed on SPSS. **Results: T**he sample consisted of 59.4% males and 40.6% females. Mean number of present teeth with sound status was 24±5. Faulty development was found in 14.6% of the patients. Faulty alignment, black/brown stains and attrition were observed in 38.5%, 86.5% and 25% of the patients respectively. No statistically significant association was found (p >0.05) between gender and faulty development, faulty alignment, staining or attrition. Forensic odontological practice and its record are not maintained in the hospital. **Conclusions:** High proportion the patients have black/brown stains. Faulty alignment is more as compared to faulty development. In **o**ur study we observed that no odonatological record is maintained in our hospital.

Keywords: Forensic odontology; Identification; Cross bite; Overbite

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INTRODUCTION

Forensic odontology is defined as "that branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings."[1] This field of dentistry and forensic odontology is well adopted in developed societies but not in our society. Throughout history, the condition and the shape of the teeth in humans has been used by dentists and archaeologists to check the various characteristics like the age and identity of the individuals. For this purpose, dental records and radiographs have been used. Other methods used to identify individuals are DNA profiling, use of fingerprints and comparing antemortem and postmortem dental records with each other. The latter method is quite reliable and simple to carry out and is especially useful when there is an unavailability of fingerprints.[2] Also lip print identification known as Cheiloscopy and rugae identification known as Rugoscopy can be used as well.[3] Knowledge of the dental status and its record keeping for future use is very useful as dental evidence for identification of the humans in disasters and criminal proceedings. Teeth are highly resistant to high temperatures of 1600 degrees Celsius as well as decomposition and survive undamaged for a much longer time than other tissues which makes it useful for many purposes.[4]

Forensic dentistry can be used to identify victims of mass disasters and accidents and to confirm the death of a person for purposes like availing life insurance policy. It can also be used to identify criminals.[2] It can be used for identification in the cases of abuse and fatalities in war.[5] The race whether it be Mongoloid, Caucasian or Negroid can be determined by studying the facial skeleton and then the sex can also be identified.[6] Finally, research can be done in this field to train medical doctors and dentists.[7] So forensic dentistry is important socially, emotionally and legally.[2] The dental status of a person means what is the actual situation of his teeth, how much and in which condition or state actually they are, or if they are present or absent.

Dental records are legal documents in which all objective and subjective information are kept by the dentist about the patient.[8] Dental records are used to identify individuals and include dental arch shape, tooth records, bite-marks and saliva examination.[2] Other types of dental records are dental cast, photograph, radiograph and progress notes.[9] Often especially in the case of accidents, the human remains are unrecognizable and so the dental records are used to identify them.[10] Dental

findings such as bridges and crowns, fillings, clinical features, fractures and malocclusion can be used along with radiography to identify individuals and compare antemortem and postmortem data.[2] Identification is easily done for those individuals who have had extensive dental treatment. Record of bite marks is particularly helpful in sexual crimes, assaults and or homicide against the victim.[11]

The justification for the use of dental records is that almost everyone has visited the dentist at some point in their lives. The distinctive dental treatments done on them along with their developmental features makes the dental records of every individual unique.[9] The information gathered from the oral examination and all other dental procedures is commonly signed and kept for seven to ten years as a legal document. These dental records could also be electronically recorded.[8] Fraud and malpractice can also be identified in this way.[12] Dental records should be comprehensive, of high quality and accurate so that all purposes are fulfilled.[13]

This study was carried out to know the status of forensic odontology and to determine the dental status of adult patients attending dental outpatient department of Ayub Teaching Hospital Abbottabad. The results of the study would help in understanding the forensic odontology and its practice for maintaining forensic odonatological record for use in identification of individuals during disasters or other medicolegal issues.

MATERIAL AND METHODS

A cross-sectional study was carried out from 1st September to 30th September 2018 in the Department of Dentistry, Ayub Teaching Hospital, Abbottabad. Sample size was calculated as 96 with WHO formula keeping prevalence of expected abnormal teeth at 20%, confidence level of 95% and allowable error of 8%. The population targeted for study were people attending the outpatient department. Adult patients having all permanent teeth were selected using non-probability convenience sampling technique. Patients with dental injuries, infections, oral or dental carcinoma were excluded. Ethical approval was taken from the ethical committee of Ayub Teaching Hospital and college. After taking an informed written consent from the patients reporting to the OPD of the Dentistry Department, data was collected on a structured questionnaire which was having the preliminary information, standard dental charting, and standard notation format taken.[14] Each patient was only examined and no intervention was done by the researchers. Oral examination was carried out with the help of a mirror and probe. Dental status of the patients was assessed by studying the physical status of the teeth and dental disorders. Statistical analysis was performed using SPSS 22 version. Frequencies and percentages were calculated for the categorical variables and mean and standard deviation for the numerical variables. Statistical significance was determined by applying Chi-square test and $p \leq 0.05$ was set as cut-off value.

RESULTS

A total of 96 patients reporting to the OPD of Dentistry Department were examined. There was no missing data. Majority of the patients 74 (77.1%) were in the age group of 26–50 years followed by 17 (17.7%) in 12-25 years and 5 (5.2%) in 51–75 years. Males comprised 57 (59.4%) and females 39 (40.6%) of the responding patients. Most of the patients 60 (62.5%) were residents of Abbottabad while, rest of the patients 36 (37.5 %) were from adjoining districts.

During examination, no faulty development of teeth was observed in 82 (85.4%) of patients. Hypodontia in 6 (6.3%) was the predominant faulty development as shown in Table-1. Similarly, the majority of the patients had no faulty alignment 59 (61.5%), attrition 72 (75%), bite marks (100%) or directional movements 94 (97.9%). However, most of the patients 83 (86.5%) showed staining on the teeth and predominantly brown staining 48 (50%) tabel-1.

While examining the status of the teeth, it was observed that mean number of teeth which were present and sound was 24±5. The range of the means of the teeth with disorders and/or artificially restored teeth was 1–2±1–5 (Table-2).

No statistically significant association was found (p>0.05) between gender and faulty development, faulty alignment, staining or attrition.

Table-1: Dental Disorder Status

Variable	Frequency (%)
Faulty development	
Absent	82 (85.4)
Peg Lateral	2 (2.1)
Hypodontia	6 (6.3)
Amelogenesis Imperfecta	3 (3.1)
Mesiodens	2 (2.1)
Distomolar	1 (1)
Faulty alignment	
Absent	59 (61.5)
Crowding	11 (11.5)
Crowding and Cross-Bite	7 (7.3)
Crowding and Overbite	6 (6.3)
Spacing	13 (13.5)
Stains	
Absent	13 (13.5)
Black	35 (36.5)
Brown	48 (50)
Attrition	
Absent	72 (75)
Present and Generalized	14 (14.6)
Present in Anterior Teeth	7 (7.3)
Present in Posterior Teeth	3 (3.1)
Bite marks	
Present	0 (0)
Absent	96 (100)
Direction of movement	
No Movement	94 (97.9)
Towards Maxillary Incisors	2 (2.1)

Table-2: Physical status of teeth

Variable	Minimum (Rounded off to Nearest Whole Number)	Maximum (Rounded off to Nearest Whole Number)	Mean (Rounded off to Nearest Whole Number)	Standard Deviation (Rounded off to Nearest Whole Number)
Number of Teeth Present and Sound	2	32	24	5
Number of Missing Teeth	0	11	2	3
Number of Recently Extracted Teeth	0	4	1	1
Number of Teeth to be Extracted	0	5	1	1
Number of Teeth with only Roots Present	0	9	1	1
Number of Teeth with Cavities	0	11	2	2
Number of Teeth with Fillings	0	8	1	2
Number of Teeth with Artificial Crowns	0	6	1	1
Number of Artificial Teeth	0	6	1	1

DISCUSSION

In this study many forensic odonatological variables were assessed. To our knowledge, this study was the first of its kind in Pakistan where such a data was gathered for a large No of variables related with forensic odontology. The disorders of faulty development included hypodontia, amelogenesis imperfecta, peg lateral teeth, mesiodens and distomolar but 85.4% of them had no such disorder. The most common faulty developmental characteristic in our study was hypodotia (6.3%), which is slightly higher than the frequency reported in a Jordanian study (5.5%).[15] Similarly frequency of peg lateral found in our study is similar in Jordanian population. The disorders of faulty alignment included crowding, spacing, cross-bite and overbite. Majority (61.5%) of our study population had no such disorders. The two main faulty alignment disorders found were spacing (13.5%) and crowding (11.5%). Till date no study documented the frequency of dental spacing and crowding. However, a Sudanies study[16] reported incidence of cross bite among Africans from 1.6–2.8% and in Sudanies male 8.5% while in our study it was 7.3% of the patients. Stains on teeth indicate the oral hygiene status of individuals. Our study found high proportion (86.6%) of patients with black and brown stains. A study conducted in Poland[17] showed 2.4–18% prevalence of black stains. The high frequency of stains in our population could be due to poor socioeconomic conditions. Attrition was present in our study in the form of generalized attrition in only 13.9% and in an Indian study[18] it was present in 29% of the subjects. Interestingly, there was no bite marks found on any of the subjects. This was in contrast to a study carried out in the United Kingdom about bite marks, where a human bite was reported almost every 3 days.[14] This study did not find any bite mark which could be due to shorter duration of the study, and this study no medicolegal case came across. Minimal movement towards maxillary incisors (2.1%) was recorded. Information about the condition of the teeth and/or presence or absence of restorations was recorded and there was a general trend of 9–11 missing teeth.

Practice of forensic odontology was not observed in our settings. Forensic odontology is neither taught nor practiced and hence there is no record. A study of forensic dentistry was carried out in Rawalpindi and Islamabad where it was found that awareness and the practice of forensic dentistry and dental status and its record keeping in dentists was poor 100%. Also despite its great importance, it was not incorporated in any undergraduate BDS curriculum of Pakistan[5] although it is included in the curriculum of India where the dentists and other professionals are now starting to comply with the essentials of the subject.[19] In United Kingdom, forensic dentistry is used increasingly in dental identification for criminal investigations and other purposes because the fingerprint databases are often incomplete.[20] A study was carried out in Saudi Arabia where antemortem dental records and postmortem dental records were compared for positive identification of dead individuals.[9] The study reported that the mean percentage of positive identification was 79.49% and considering the characteristic recorded in our study 95% identifications are expected.

Victims of the 2006 tsunami in Thailand were identified with the help of dental records.[21] The percentage was about 46.2% and the earth quake disaster in Pakistan had no such odontological record that could have been used for identification. So, it is essential to establish the practice of recording the forensic odonatological record for all these purposes.

The strength of the study was that the majority of the forensic odonatological variables were recorded by qualified dentists using international format of dental chartings. The limitations of study were its short duration and convenience sampling. Using random sampling with better study designs as well as using more sophisticated methods like DNA analysis are recommended for further studies.

CONCLUSION

Forensic odontology is not practiced in our settings. Faulty alignment, dental stains and attrition are the major odontological characteristics that could be used for identification of human bodies and for timely provision of justice in criminal cases.

Recommendations: Keeping in view the importance of Forensic odontology its teaching at undergraduate level, its practice at major hospitals and its record keeping should be promoted. Pakistan is situated in high seismic zone and its people are highly vulnerable to natural disasters. Moreover, due to war against terrorism, Pakistani citizens are at high risk of terrorist attacks that result in mutilated bodies. Odontological record can help a lot in identification of such dead bodies. It should be suggested to PMDC that a compulsion should be forced on dentists and dental hospitals to make record of dental status of their patient for such useful purpose in future.

AUTHORS' CONTRIBUTION

NS, IA, FS: Concept, Study design, write-up. AR, NSK: Data collection, data interpretation. OKJ: Write-up, proof reading.

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